WITH METALLURGICAL SECTION

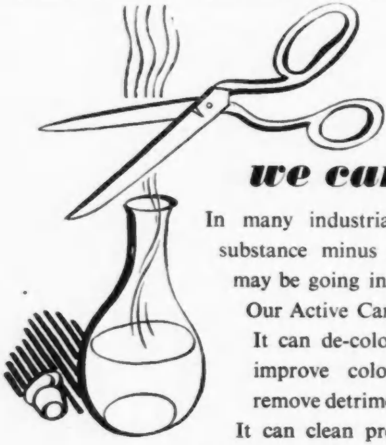
The Chemical Age

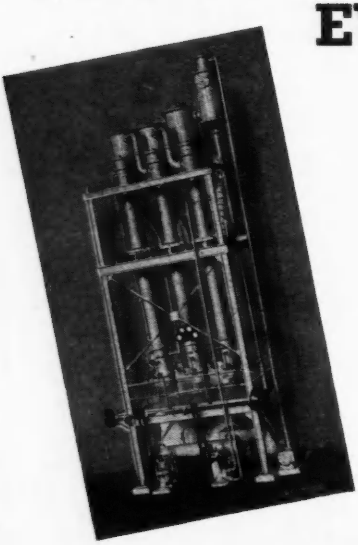
A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LI
No. 1305

SATURDAY, JULY 1, 1944
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.



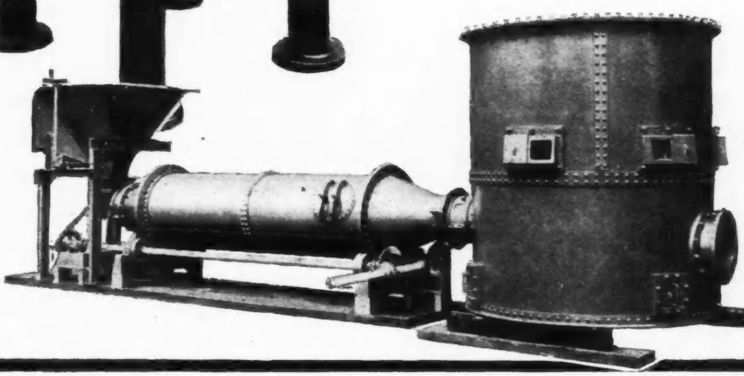


SULPHUR BURNING EQUIPMENT

THIS PRESSURE SULPHUR BURNER, non-mechanical and occupying only small floor space, can be worked under pressures up to 10 lbs. per sq. in.
It is particularly suitable for the manufacture of sulphites, bisulphites, metasulphites and anhydrous sulphur di-oxide ; also for treatment of glue and in the sugar industry, etc.
Available for variable SO_2 concentrations, according to specific requirements. It is readily put into or out of commission.

THE ROTARY MECHANICAL SULPHUR BURNER, of automatic feed and operation, is particularly suitable for sulphuric acid plants (chamber or contact process).
With uniform burner-gas composition of variable SO_2 concentration dependent on permissible draught, it is capable of dealing with sulphur material of relatively high ash content.
Automatic ejection of inorganic ash.
High throughput with low power and maintenance costs.

NC



NEWTON CHAMBERS

NEWTON CHAMBERS & CO LTD THORNCLIFFE IRONWORKS Nr SHEFFIELD

Industrial Floor and Wall Surfaces for EVERY PURPOSE

NOW OR POST-WAR

IF YOU HAVE A PROBLEM IN CONNECTION — WITH WALL OR FLOOR SURFACES —

Why not take it to Prodorite Limited, who have the knowledge to give you expert help ?

PRODORITE COMPLETE SERVICE INCLUDES

— Materials of Construction
— Time proven designs
— A full Contracts Department
and
— Supervision of Contracts

The services of our Technical Staff are offered without obligation to assist Architects and Industrial Firms with their floor and wall problems —acidproof and non-acid. Write for particulars, outlining your specific requirements.

FACTORIES
General Shops
Loading Docks
Gangways
Offices
Canteens
Passage-ways
Laboratories
Lavatories

INSTITUTIONS
Entrance Halls
Offices
Corridors
Dining Rooms
Kitchens
Lavatories

SCHOOLS
Entrance Halls
Corridors
Classrooms
Dining Halls
Kitchens
Lavatories

DAIRIES
Process Rooms
Loading Decks
Gangways
Offices

ALSO
Feeding Centres
Hostels
Hospitals
Power Stations
Warehouses
Fire Stations
Emergency Feeding Depots

EAGLE WORKS WEDNESBURY

PRODORITE LTD.

ARTILLERY HOUSE ARTILLERY ROW LONDON . S.W.1

Phone : WEDnesbury 0284 (Pri. Br. Exchange)

Phone : ABBey 1547 & 1548

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON Telephone: CENTRAL 3212 (10 lines)
GLASGOW: 116 Hope Street (Central 3970) BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited.

VOL. LI No. 1305 July 1, 1944 Annual Subscription 21s. Overseas 26s.

Management and Employment

A HEAVY obligation confronts management in all branches of industry. It may be that the obligation is heaviest in industries which manufacture and use chemicals; that is to say, in industries in which the application of science is at a maximum. In these industries lie perhaps the principal opportunities for advancement, for the development of new processes and for the production of entirely new types of material. The view that industry—and particularly management of industry— must regard itself as responsible for the creation of the right social conditions after the war was put forward by Henry Kaiser, the well-known American industrialist, in an address to American industry over a year ago. With the passing of this year what Henry Kaiser had then to say has become even more important. The war has taught us all that there is nothing which reasonable men are determined to do that cannot be done, and that no obstacle, political, economic, financial, or social, can stand in the way. The leaders of industry—and they comprise everyone whose duty it is to exercise initiative in the direction of affairs —are accustomed to this sort of thing. The great majority of people, however, are not accustomed to it and cannot be expected to take the initiative in the same way and to the same degree as management. They have not the experience, the background, nor the opportunity.

The world has been brought up during the last 20 years with the idea that there is plenty for everyone without necessarily working for it. Much of our post-war planning depends upon giving something for nothing to vast numbers of people. The schemes for social betterment and so forth are all very well in their way but they are not likely to be productive of a sturdy enterprising type of mankind. Henry Kaiser has illustrated this principle with a particularly interesting parable, one worth quoting in full. "Out on our mid-Pacific Coast, in beautiful Monterey Bay, there was long ago established a sardine factory on a pier which extended well out over the water. Every day the refuse was thrown overboard and every day huge flocks of pelicans came to feed upon it. Then there grew up a generation of pelicans which had known nothing but plenty, freely distributed in an almost unlimited daily ration. Suddenly, men discovered that the practice of wholesale sardine fishing had interfered with nature's

On Other Pages

law of supply and demand: and, to make a long story short, the sardine cannery was closed. For some days the new generation of pelicans swam about in consternation and dismay. Then they bethought them of the old pelicans who had lived and prospered long before the era of bountiful refuse. And so they took counsel with their elders: first to protest because the supply of food had been shut off, and then, with a deepening sense of the futility of protest, to ask for sage advice as to what to do. The old pelicans heard the story without alarm, and after due deliberation the eldest made a short speech to the new generation of pelicans in which he said: 'There is only one answer to your need for food—you must go out and fish for it!' "

In this parable lies a profound truth: the epoch of bounty has passed, the hand-out era has been completely swallowed up by a war debt which represents not only the spending of the nation's wealth, but the mortgaging of its future. We must all go back to work. Out of our efforts, new wealth must be created, and some of it saved.

Henry Kaiser's proposal is that management of organised industry should take the lead in setting on foot great schemes that will lead to the betterment of people on an economically sound basis and at the same time provide them with work. His point is always that the only sound method of rehabilitation of the world is work, the production of goods and services. In this he is undoubtedly right, but whether his schemes can be put into effect remains to be seen. For example, he points out that in America, on the day peace is declared, that there will be a million, or even more than a million, young men trained to live and work in the air, and there will also be a great throng of young men and women whose attention has been concentrated on the manufacture of servicing of aircraft. "Their skills," he says, "have already been developed and channelled into service in this giant industry which offers such momentous promise. Let it be said again that the artisans and the pilots now in service and in training are young. The whole future is theirs. For them, the air offers the life work which is to be their ruling ambition. This is a prospect to which there is no parallel in history. It is a new chapter in evolution; it is the opening of an era in transportation, the social consequences of which stagger the imagination. Has the aviation industry, with its present record of daring and achievement, the fortitude to stretch its capacities now, so as to pledge these young millions a stirring and adventurous career?"

This is just one example of bold planning on a comprehensive scale. It is planning on a scale to be expected from a man of Kaiser's abilities and background. Whether we are big enough in this country to do anything of the sort is still uncertain. We can imagine as one possibility the organisation of the coal carbonisation industries to provide smokeless fuel—gas and coke—for every household in the British Isles. We can imagine a chemical industry based upon the tar, upon the more readily condensable constituents of the gases, and possibly upon the coke through the Fischer-Tropsch process, which would take advantage of these great developments. Can the coal industry, the gas and the coke-oven industries, the tar distillers, the chemical industry, and the manufacturers of all the plant and appliances which would be required, combine to work out this great scheme and to set it in motion? After the war it will be necessary for the nation to "think big." Those who are accustomed to thinking big are the managements of our larger concerns. In Henry Kaiser's words: "Upon management there rests a great responsibility in the post-war world." People need constructive industrial leadership. They want work and basically they do not want "hand-outs."' The challenge to management and its responsibility is to give them an immediate opportunity to go to work, first at home: then, as the needs become clear, and under the ægis of a statesmanship that is wise as well as generous, the fruits of their labour may go abroad to further the opportunities of these for whose freedom they now fight. We have the whole world to work upon, for it is beginning to be recognised that there will never be any significant prosperity in any country so long as anywhere on earth there are great hosts of people living on the margin of poverty.

NOTES AND COMMENTS

The Young Metallurgist

AN appeal to metallurgists to bring the results of their researches on iron and steel to the notice of the Iron and Steel Research Association was made last month by Sir Arthur Dorman, of Dorman, Long & Co., Ltd., in his presidential address to the Iron and Steel Institute. "If all sections of the iron and steel industry," he said, "were equipped to meet world competition, we could regain and expand our export trade." He recommended that plants should be put into suitable condition at the earliest possible moment. It certainly seems that the iron and steel authorities are doing their utmost to put their house in order. Not only is the new research association well under way, financed by the British Iron and Steel Federation and the D.S.I.R., but also the Institute is working hard to bring about a scheme of affiliation with local technical institutes, with a view to encouraging the younger men to join both local associations and the Institute. The scheme, too, for national certificates in metallurgy will be in operation in a few months, and will give recognition to young men who have attended technical colleges. If Sir Arthur's hopes are fulfilled, metallurgists with the requisite qualifications will be able to graduate to professional membership of the Institute; and this would mean that metallurgy would take its rightful place as a profession alongside chemistry, engineering, and physics.

Post-War University

WITH characteristic Yorkshire enterprise, the University of Leeds has issued its proposals for post-war development, basing these largely, it would appear, on the broad suggestions for university development in general on which we have commented recently. There is no headlong rush about the proposals; provision is made for an immediate post-war programme, for a ten-year intermediate period, and for a long-term period. The annual income required for the first period is £105,000, and for the last, £357,000. Stress is laid on the way in which research has been hampered by lack of funds, and it is claimed that a minimum sum of £20,000 per annum should be allocated to this purpose. As the educational centre of a great industrial district, any money that the University spends on research should be easily recouped many times over. It will perhaps surprise some people to hear that the total sum available to all departments in 1938-39 was £3600, including expenditure on apparatus. In considering the question of research, the interdependence of departments is not forgotten, and it is pointed out that there should be better facilities for the exchange of staff between universities, research institutions, and industrial research laboratories. It is generally agreed that degree courses should last four years, because of the wide variety of information now required as well as the greater complication of technical knowledge; and the first year of a four-year degree course would consist largely of studies of a general nature. It is particularly significant that in a university associated in the minds of many with technology, stress should be laid on the fact that insufficient attention has been devoted to courses of a general nature, and that only those really fitted for specialised courses should be allowed to enter for them.

Staff Salaries

CLOSER relations between students and staff are stated to be one of the most urgent needs; and with this we heartily agree. It is well suggested that this should be attained by the establishment of more residential halls, and a greater use of discussion classes. In addition, a tutorial system is desirable, as well as a special advisory committee for the welfare of overseas students. While the welfare and financial maintenance of students is a principal consideration of the report, staff conditions are by no means neglected A proposed scale of basic salaries is quoted, and it is recommended that this should start immediately after the war for present members of the staff. A schedule of new posts is set out, and the establishment of new schools recommended, varying from aeronautical engineering to Slavonic studies. Consultation should

take place between universities to arrange for the location of schools which are at present inadequately represented in this country. Chemists will be glad to hear that, in the building programme, the construction of the chemistry wing could be put in hand at once: and an interesting departmental point is the need for the establishment of three Chairs for the chemical side of Medicine: in Pharmacology, Biochemistry, and Pathological Chemistry.

The Economic War

IN the early days of the war the blockade of Germany was relatively ineffective. Indeed, with the fall of one European country after another the Nazis gained control of vast quantities of raw materials, which made them less reliant upon ersatz production than they had to be in 1939. The trend is quite the other way now. The Germans are on the retreat, and their raw material resources have dwindled as they left behind them the manganese of Nikopol, the sulphur of Sicily, and now the mercury of Monte Amiata. In a matter of weeks they stand to lose three-quarters of their nickel supplies, for Petsamo, in Finland, will not hold out much longer. The allied weapon of economic warfare grows sharper, and the fabric of Germany's industry is being disrupted. The material factors that control production and the distribution of the weapons produced, are the supply of raw materials, the capacity of factories and workshops, the available labour, and transport resources. The last item is to a large degree determined by the fuel position, and of recent weeks there must have been a marked deterioration there, particularly with regard to liquid fuel supplies.

Target—Oil

OUR air forces have been making heavy and persistent attacks on the German oil industry wherever it is sited. Rumania's important refineries have all, with perhaps one exception, been put out of action, so that Rumania's quota—one-third of Germany's oil resources—is not going into the war machine. Oil production in Hungary and Austria has been stepped up, but here, again, the principal refineries have been heavily bombed, as has the refining centre at Bratislava. German domestic production of natural oil depends upon one oilfield in Hanover and another in the north. Both of these have been bombed, and a great weight of explosive has also fallen in recent week's on the synthetic plants which provide about a third of her oil. The fact that training flights in the Luftwaffe have been curtailed for some time is one proof that the attacks planned by the economic warfare departments were directed at the right targets.

Second-Line Factories

THE position on Germany's factory front encourages allied hopes. In the Reich, production centres have been blasted again and again, while the output figures of the second-line factories in the occupied and satellite countries can offer little consolation to the heads of the German supply departments. French industry is said to be working a very short week owing to fuel shortages and the impossibility of coal transport on an adequate scale. The situation in Belgium and Holland is no better, while the Danes may perhaps be said to hold the record for the proportion of industrial premises they have sabotaged. As for the Balkans, traffic difficulties are now so intense that mineral supplies can be exported only with long delays. Although the Germans still hold most of the industrial areas of Italy, they cannot make much use of the factories, as many have been bombed, raw materials are short, and they cannot take the finished goods out of the country because the few railways in use are crammed with military traffic. Into the picture must also be introduced the stoppage of Turkish chrome exports, and the reduction of wolfram supplies from the Iberian peninsula. In his memoirs, Ludendorff told of the depressing effect on the morale of the troops produced by the sight of vehicles stranded for lack of oil in 1918. The pattern of our economic warfare suggests that a spectacle every bit as depressing is in store for the Nazis, who are going to lack many things besides petrol.

Moisture Determination in Powders

Dielectric Constant Measurements

THE dielectric constant of the majority of powders used in industry is not far from 2, whereas the dielectric constant of water is roughly 80. It has often been proposed, therefore, to use the dielectric constant of moist powders for estimating their water content. E. N. Guryanova (*Zavodskaya Laboratoriya*, 1941, *10*, 569) describes the application of this method to dyestuff powders and points out some difficulties inherent in the method when applied to any powder.

Special Apparatus

The dielectric constant of a material is usually determined by measuring the capacity of a condenser filled with the material. For capacity measurements simple and reliable apparatus is available, but a special condenser is required for powdered material. Guryanova's condenser consists of a hollow brass cylinder fixed in an ebonite base, with a thick brass rod forming the axis of the cylinder. The cylinder is earthed, and an alternating potential applied to the rod. The space between the rod and the cylinder is filled with the moist powder. The capacity of this condenser naturally depends on the height of the powder layer. That can be accounted for by previously calibrating the condenser filled to various levels; although, strictly speaking, the calibration curve depends on the dielectric constant of the powder. A more serious difficulty is created by the effect of the degree of compression of the powder. The higher the compression (at a constant moisture content), the greater is the capacity. To achieve a reproducible degree of compression the condenser is provided with a piston (a short length of brass tube on to which a brass ring is fixed) which can slide over the brass rod within the brass cylinder and press the powder against the ebonite base.

Alternative Methods

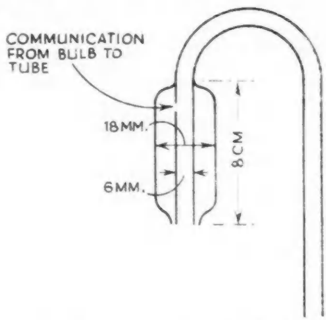
Two procedures are possible. Either always the same amount (mass) of powder is taken and compressed to always the same volume, or any amount of powder is filled in but the piston always loaded with the same weight. When the latter method is followed, it is found that the finer the powder the greater is the capacity; and if the particle size of two powders is very different, the first procedure seems to be unworkable. It is recommended, therefore, always to use a fraction of the powder characterised by a definite range of sizes; but, obviously, the fractionation may affect the moisture content.

Guryanova's experiments dealt with commercial dyes, *i.e.*, mixtures of dyestuff, filler (20-40 per cent.), and water. Under favourable circumstances 1-15 per cent. of water can be determined with ± 0.2-0.3 per cent. in 3-5 minutes. Higher water contents cannot be estimated, since the increased electrical conductivity makes capacity measurements uncertain. The nature of the filler (an inorganic salt, *e.g.*, sodium sulphate) is irrelevant so long as the humidity is low, but different fillers impart different conductivities to the moisture so that, when the conductivity becomes noticeable at all, the results of the measurement depend on the filler as well, not only on the water content.

Automatic Siphon

A Simple and Ingenious Device

AN automatic siphon, useful for siphoning liquids where sucking to start the flow is impossible or inconvenient, is described by H. Tompa in *J. Scient. Instruments*, 1944, *21*, 5, p. 88. It consists of a bent tube whose shorter limb is surrounded by a bulb with a constricted opening; the bulb communicates with the tube by a small hole at the top. If the shorter limb is plunged into a liquid so that the bulb is fully immersed and the bend is not too high above the surface, liquid rises at once up the inner tube and slowly into the bulb; it



pushes the air there through the hole into the tube, where it rises and, acting as an air lift, carries the liquid over the top of the bend. Once started, the siphon acts as an ordinary siphon. The dimensions given in the sketch have been found satisfactory, though they are probably not an optimum. A glass-blower of average skill should be able to construct the siphon; it is only important to keep the opening at the mouth of the bulb small, so that it takes 3 sec. to 5 sec. to expel the air.

Germany's Reserve Chemical Industry

Factories Near the Front Line

THE major chemical factories of Germany have received close attention from the experts of the Ministry of Economic Warfare and from the Strategic Air Forces of Britain and America. With the intensification of the air attack upon chemical centres in the Reich has grown the importance of the smaller producing units in the occupied countries, and one may be sure that all those factories which are economic to run are being worked to the limits imposed by the availability of man-power and the availability of raw materials; the second factor is dependent upon transport as well as labour reserves. Into some of the occupied and satellite countries the Germans have introduced new processing plants and have expanded those already in existence before the territory came under German control: the exploitation of Hungary's bauxite deposits is a good example. With the advance of the armies of the United Nations towards the frontiers of the Reich, many of these factories will be coming into the front line. They may be destroyed or they may change hands, but either way it will represent a critical loss to the Germans. We believe therefore that this new series of articles, giving an account of the chemical industries in those countries which will become theatres of military operations in the near future, will be of great interest to the readers of THE CHEMICAL AGE. *This first article deals with Eastern Poland.*

I—Resources of Eastern Poland

For the purpose of this article the most convenient division of Poland is along the Curzon Line. That part of the country which lies east of the Curzon Line is less important from the point of view of the chemical factories and natural resources it contains than are Upper Silesia and the region around Cracow. The most important chemical industries are situated in the last two areas.

Starting in the north of Eastern Poland, in *Wilno* (Vilna) are two firms processing natural rubber; vegetable oils, such as linseed, rape, and sunflower, are processed, margarine is produced, and wood distilled. *Lida* has a small pharmaceutical industry (mostly based on herbs) in addition to vegetable-oil extraction and wood distillation. Five other towns—*Slonim, Baranowicze, Pinsk, Luck, Rowne*—have wood-distillation plants. It should be noted that these wood-distillation units of Eastern Poland produce charcoal, acetic acid, methylated spirits, and acetone, but do *not* turn out either formaldehyde or hexamethylene tetramine (the latter an important compound for use in the manufacture of explosives, pharmaceuticals, and rubber-accelerators).

In the southern part of Eastern Poland the country is not industrially developed; the density of population is lower and the output is restricted mainly to agricultural products. The phosphate rock, which occurs in several places here (*e.g.*, Slonim, Pelcza) has a low P_2O_5 percentage; before the war it was mostly ground up and used in fertiliser mixtures along with nitrogenous compounds, while the superphosphate manufacture which was carried on in 13 Polish factories depended upon phosphates imported from Russia and North Africa, and even from the U.S.A. The former general manager of the Federation of Polish Chemical Industries, Tadeusz Rozyc-Zamoyski, describes Poland's own deposits of phosphate rock as "of little practical importance" (*Petroleum*, February, 1944), but it is not clear whether the fact that Poland did not use native rock for superphosphate production is explained by its low P_2O_5 content or by the shortage of sulphuric acid for processing it in Poland.

Another wood-distillation plant is situated in the town of *Hrubieszow*. The capital of Galicia, *Lwow*, had several small chemical factories making soap, perfumes, etc. A small casein-plastic industry, depending on five factories, was also situated in Lwow.

At *Tarnopol* there are plants extracting vegetable oils, also margarine factories and wood-distillation plants.

The most important chemical district of Eastern Poland is just south of *Drohobycz*, the oil centre of Galicia; the second oil centre is *Boryslaw*. It is interesting to remember that the Boryslaw oil basin was discovered in 1898 by the Canadian prospector William McGarvey, acting on information received from the Polish mining engineer, Szczepanowski, who visited Canada in the late 1870's. Associated with this district are potassium salt deposits, the outcrops of which run parallel to the line of oil wells. (This association of oil with salts is a frequent occurrence, being found, for instance, in California.) In the Polish deposits kainite and sylvinite predominate; the annual gross yield was over 500,000 tons, equivalent to 108,000 tons of K_2O. These potash deposits were not developed except for use in fertilisers. The rock salt deposits at Wieliczka (in Western Galicia) are well known, the workings being very old.

Associated with the petroleum is natural gas; it is not known of what compounds this gas is composed, but before the war it was little exploited, and it is unlikely that the Germans have found much use for it owing to the proximity of the battle front.

The apparent lack of mineral resources in Eastern Poland may be misleading; systematic exploitation of natural resources can only follow sound geological survey, but except in the oil and salt areas little had been done in this direction.

The only other important production of a chemical nature which requires to be mentioned is that of resin and turpentine, which were turned out in quantities large enough to enable pre-war Poland to compete with France.

Since this article went to press, an interesting note has come to hand, bearing out the forecast in our introductory paragraph. On Tuesday evening an official communiqué reached London reporting that heavy bombers of the United States Strategic Air Force, operating from Russian bases, bombed the oil plants at Drohobycz. The report stated that these were "synthetic" oil plants; but in view of the fact that Drohobycz is one of the main natural oil centres of Galicia, it seems probable that the plants attacked were refineries dealing with the local product.

Since the invasion of Europe began the employees of a North London factory have increased their contribution to the Red Cross Penny-a-Week Fund from a penny a week to a penny a day.

That a reduction in hours of work tends to raise output per hour is confirmed in the fifth Emergency Report of the Industrial Health Research Board of the Medical Research Council (H.M.S.O., 4d.).

Parliamentary Topics

Foamed Slag

IN the House of Commons last week Mr. Quibell asked the Parliamentary Secretary to the Ministry of Works how many plants for processing foamed slag were now operating; how many were to be erected under the agreement with the Iron and Steel Control; when these would be in production, and where they would be located. Mr. Hicks replied that slag was now foamed at two works. Under arrangements being worked out with the industry, with the assistance of the Iron and Steel Control, the intention was to instal foaming plant at blast furnaces where there would be available slag suitable for the purpose. It was intended to have these plants in operation by the time it was possible to start the house-building programme. It was obviously not yet possible to particularise on the location of all works, but foamed slag would be available over a very considerable area of the country.

Turkish Chrome for Britain

The Foreign Secretary, in a written reply to Sir Leonard Lyle, stated that all exports of chrome from Turkey to Germany had ceased since the morning of April 21. Mr. Eden added that all chrome not delivered to Germany under the Clodius agreement was to be acquired by ourselves. Technical discussions were about to start to enable us to take over all chrome produced by the Turkish mines up to the end of 1944, including that already mined for Germany.

Patent Law Committee

The President of the Board of Trade, Mr. Dalton, in reply to a question from Mr. Salt, gave an assurance that the report of the committee set up to examine the Patent Laws would be published, adding that he understood it was the intention of the committee that, as a general rule, the evidence should also be published. To the membership of this committee (*see* THE CHEMICAL AGE, 1944, *50*, p. 433) the name of Mr. John Venning has now been added.

PATENT COFFEE-BEAN PLASTIC

A method for making plastic moulding material from coffee beans has been patented by Herbert S. Polin and Albert I. Nerink, of New York (U.S. Patent 2,340,426). The oil is removed from the green bean and fractionated, and oleic and linoleic fractions reintroduced. The material is subjected to heat, pressure, and a mineral acid in the presence of steam to remove furfural as formed. A portion of furfural is added to the treated bean residue to produce the moulding material.

Swedish Chemical Research

Larger Subsidy Demanded

IN a recent speech, the president of the Association of Swedish Chemical Industries, Mr. Otto Cyrén, commented on the undeveloped state of Swedish work in the field of pure and applied chemical research. He compared Sweden's achievements with those of Switzerland; although both countries were poor in raw materials for the chemical industries, he said, Switzerland had succeeded in building up an important chemical and pharmaceutical industry aided by systematic research.

The absence of a chair of applied organic chemistry at Stockholm Technical College had been criticised, and it was reported that such a chair was to be installed in the near future. Conditions at Göteborg were less satisfactory, however. Pure and applied chemistry had a combined chair, and the establishment of a separate professorship of pure chemistry was not contemplated before 1949/50. In the past, too much emphasis had been laid on inorganic chemistry, with the result that organic chemistry and biochemistry had been neglected.

Measures suggested to bring about a speedy reorganisation of the educational system as regards chemistry included the appointment of qualified foreign research workers, for whom there would be a wide field of activity in Sweden; the appointment of more and better-paid laboratory assistants; and the installation of modern apparatus. There were at present not more than 600 students of chemistry, but their number was stated to be increasing. Present State subsidies are considered insufficient: funds granted to the Universities of Upsala and Lund, and to the Technical Colleges of Stockholm and Göteborg, as well as to the so-called Caroline Medical and Surgical Institute, totalled only 10,400,000 kronor (about £600,000). A fundamental change was therefore being suggested by scientists and industrialists alike, in order to enable Sweden to keep abreast of scientific and industrial progress.

New Laboratories

According to later advices, the Swedish Academy of Engineering has recently opened a large fuel research laboratory in the vicinity of Stockholm, and it is stated that research on synthetic and substitute fuels will form part of the new laboratory's activities; while a wood research institute and a cement and concrete research laboratory are being erected near by. Research institutes for metallurgy and leather technology are also in the planning stage. At Göteborg, the Chalmers Technical College has decided to establish a textile research laboratory, the cost of which will be borne jointly by the State and by industry.

Personal Notes

DR. E. H. T. HOBLYN, Ph.D., A.R.C.S., A.R.I.C., A.M.I.Chem.E., has been appointed secretary of the British Chemical Plant Manufacturers' Association.

DR. G A. COWIE, chief technical adviser to Potash, Ltd., 112 Fenchurch Street, London, E.C.3, has been awarded the degree of D.Sc. by the University of Aberdeen.

MR. H. A. SKINNER, B.A., B.Sc., D.Phil. (Oxon.), has been appointed assistant lecturer in chemistry at the University of Manchester.

For his valuable geo-chemical survey of the underground water supplies of the Union of South Africa, the chief chemist to the Electricity Supply Commission, DR. G. W. BOND has been awarded his D.Sc. in the University of South Africa.

MR. J. C. F. FRYER has been released from his duties as director of the Plant Pathological Laboratory, Ministry of Agriculture, to become secretary of the Agricultural Research Council, with which he has been associated since its establishment in 1931.

MR. K. HEADLAM-MORLEY succeeds Mr. J. Shaw Scott as secretary of the Institute of Metals. Mr. Headlam-Morley is also secretary of the Iron and Steel Institute, and it is through the friendly co-operation of the latter society that he is able to act as secretary for both.

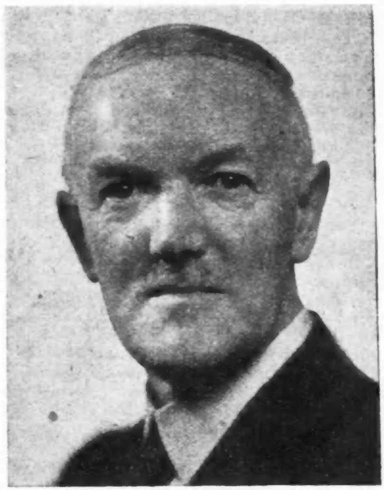
MR. JAMES MACGREGOR, managing director of Ernest Scott & Co., Ltd., and of George Scott & Son (London), Ltd., retired from the boards of those companies on June 30. He has also retired from the boards of Henry Balfour & Co., Ltd., and Enamelled Metal Products Corporation (1933), Ltd., but continues on the board of British LaBour Pump Co., Ltd.

MR. J. PARAVICINI, J.P., deputy-chairman of Turner's Asbestos Cement Co., Ltd., has relinquished his duties in the Turner & Newall organisation. Mr. Paravicini went to Merseyside in 1916 to establish the cement industry there, and was actively connected with the Everite works. In 1942 he became chairman of the National Joint Council of the Asbestos Manufacturing Industry.

MR. HAROLD HOBSON, B.Sc., M.Inst.C.E., M.I.E.E., general manager of the Central Electricity Board, has been appointed to succeed Sir Archibald Page, M.Inst.C.E., M.I.E.E., chairman of the Board, who resigns for health reasons on July 31. Consequent upon the appointment of Mr. Hobson, the Central Electricity Board have appointed SIR JOHNSTONE WRIGHT, chief engineer, to succeed him as general manager. MR. J. HACKING, deputy chief engineer, has been promoted to be chief engineer.

DR. ARTHUR C. COPE, associate professor of chemistry, Columbia University, will receive the 1944 American Chemical Society award in pure chemistry. At present actively engaged on a war research programme involving both chemists and biologists, he is noted for his investigations into the synthesis of vinyl substituted active methylene compounds and the re-arrangement of allyl groups in these types.

MR. GILBERT SHAW SCOTT, on attaining the age of 60, retired on June 30 with the title of Secretary Emeritus from the office of secretary of the Institute of Metals, which he has held since the foundation of the Institute in 1908. He studied metallurgy in the University of Birmingham under Professor T. Turner (whose elder daughter



Mr. G. Shaw Scott.

became his wife in 1913) and, in 1906, was the first student to take the Birmingham B.Sc. degree in metallurgy. He was also awarded the Bowen Research Scholarship in Metallurgy and, in 1907, the M.Sc. degree.

After a year spent in visiting metallurgical plants in America and Europe he was appointed secretary and editor of the newly-formed Institute of Metals (out of 160 condidates) in 1908. The building up of the Institute from an essentially British membership of 250, at the end of its first year, to a world-wide total of over 2500 thirty-six years later, has constituted Mr. Shaw Scott's life work. He has seen the Institute progress from an office in the Metallurgical Department of Birmingham University to a "fifth-floor back" in Caxton House, Westminster, and thence by stages to the splendid pre-

mises in Grosvenor Gardens which it now shares with the Iron and Steel Institute.

An appreciation of his services was formally recorded in the report of the last annual meeting of the Institute, when Dr. W. Cullen, seconding the president's motion for the adoption of the report, declared that the Institute has been very largely dependent on the work of the secretary for its great success, and that Mr. Shaw Scott had been a model of what a secretary should be.

At a graduation ceremony at Edinburgh University on Friday last week, the honorary degree of LL.D. was conferred on MR. JAMES CAMERON SMAIL, principal of the Heriot-Watt College since 1928. The D.Sc. degree was awarded to MR. JAMES DOBSON, A.I.C., and to MISS EVELYN HALCROW, B.Sc., for work on antimalarials; and to MR. R. C. MACKENZIE, B.Sc., for a thesis on "The Thermal Decomposition of Hydrogen Peroxide Vapour." In the Faculty of Science, the Vans Dunlop Scholarship in Chemistry was won by MR. A. H. MCINTOSH, B.Sc.; the Crum Brown Chemistry Medal goes to MISS CATHARINE JARVIS, and the Norman Lucas Chemistry Prize to MR. W. I. H. WINNING.

Obituary

FLIGHT-LIEUTENANT THE HON. MICHAEL JULIUS WEDGWOOD BENN, D.F.C., eldest son of Viscount Stansgate, is reported killed in action in the most gallant circumstances on June 23. He is the second grandson of Sir John Benn, the founder of Benn Brothers, Limited, to give his life for his country, the first having been Captain Christopher Benn, the youngest son of Sir Earnest Benn. Flt.-Lt. Benn, who was only 22 years old, had been a night fighter, and in North Africa he had brought down at least four enemy aircraft. He specially prized his D.F.C. because his father had been given the same decoration in the last war.

DR. HAROLD HUNTER, D.Sc., F.R.I.C., A.Inst.P., A.M.I.Chem.E., who died suddenly on June 24, aged 47, was one of the most active Fellows of the Royal Institute of Chemistry. He had served on the Council since 1939, and had been chairman of the Manchester section for three years. A London University man, he worked under Sir Robert Pickard at the Battersea Polytechnic, and in 1928 he was appointed head of the rayon department at the Shirley Institute, Manchester, where he was engaged in long-term researches on rayon. His versatility as a chemical engineer can be gauged from his researches on behalf of the Government on special garments for the Services, and from the fact that, among the seven electron microscopes "lent-leased" to this country by the U.S., Hunter's was the first one actually to get working. His keen interest in the progress of the younger members of his profession was well known, and his untimely death is a great loss to chemical industry in general and to rayon chemistry in particular.

We deeply regret to record the death by enemy action of MR. and MRS. H. W. DUCK. They had for many years been pillars of the business structure of Bouverie House from which this and other trade and technical journals are published. Indeed, their combined service with Benn Brothers, Ltd., amounting to over 60 years, was probably a Fleet Street record. Mr. Duck held one position of trust after another, being successively manager of *Farm and Home*, *Gardening Illustrated*, and *Discovery*. Although in the region of 60 years of age when the war broke out he was determined to see the thing through, and when the call came he assumed a heavier responsibility than any he had taken before. He became, 18 months ago, acting manager of the big export paper, the *British Trade Journal*, when the head of the department, Mr. Keon Hughes, joined the Colours. Mrs. Duck was for many years chief assistant to the manager of the *Hardware Trade Journal* and made a considerable contribution to its rapid expansion. She retired in 1932 but her husband was in harness to the end, working as loyally and enthusiastically as ever.

HUGE RESIN DRYER

The world's largest resin dryer has been erected at Bridesburg, Pennsylvania, for the American firm, Resinous Products & Chemical Co. It converts liquid urea-formaldehyde resins by a new process into powder.

The new resin-powdering unit, employing a spray-dry process, resembles a huge gas holder in shape and size and its vast capacity was dictated by ever-increasing uses of synthetic adhesives in producing and assembling gliders, aeroplanes, torpedo boats, barracks, shipping crates, military truck bodies, skis, and snowshoes. Liquid resin, pumped to the top of the four-storey hot-air chamber, is converted into a fog by the action of a high-speed centrifugal wheel, and falls to the floor as a fine powder. A revolving knife blade brushes the powder into ducts, then into collectors where air is removed, and conveyors carry the powder over screens and into shipping drums.

The identification of laevo-2,3-butanediol as the chief product when grain mash is fermented by a specific organism, *Bacillus polymyxa*, is reported by four research workers of the U.S. Department of Agriculture's Northern Regional Research Laboratory in *J. Amer. Chem. Soc.* (1944, 66, 4, p. 541).

Metallurgical Section

Published the first Saturday in the month

Metallurgical Section

July 1, 1944

Heat-Treatment of Light Metals

The Improvement of Mechanical Properties

by Dr. O. P. EINERL, M.I.M. and F. NEURATH, Ph.D.

As both the light metals, aluminium and magnesium have, when pure, an ultimate tensile strength of only 5-7 tons per square inch and a Brinell hardness of 24-32, they are mostly used at present in the form of alloys, not only for sand and chill castings but also for sheet, strip, wire, tube, rod or extrusion, and the mechanical properties of these alloys in the "as cast" condition show an improvement to double or more of the tensile strength and hardness figures for pure metals. A further improvement of the wrought light alloys is possible by work-hardening; this means that they can be strengthened by cold work, such as rolling or drawing, and any alloy can be obtained either in the "soft" condition or in various "tempers" such as "half-hard" or "hard."

Another way of obtaining maximum mechanical properties (up to tensile strengths and hardness five or six times that of pure metals) is by a combination of working and heat-treatment applied to wrought alloys, or by heat-treatment alone applied to sand or chill castings. The phenomenon whereby certain light alloys—and also other non-ferrous alloys—could be strengthened by heat-treatment was discovered by the German, Alfred Wilm, in 1909, and his discovery placed the light alloys among the most important engineering materials. Wilm found that when an alloy (which he called Duralumin) was quenched from about 500° C. it became soft, but after standing for several days its strength increased to a level considerably above the original figure. These changes are therefore almost exactly the opposite of those commonly known as occurring in the heat-treatment of steel.

When two metals are melted together, one of them very often dissolves in the other, like sugar in tea or alum in water, and more or less of the dissolved metal remains in solution after the melt has cooled and solidified. This solid solution, comparable to a frozen solution of sugar in tea, is merely a phase of the alloy without definite composition. Very little can be seen under the microscope of the distribution of the two different metals, but this solid solution has many useful properties, as the crystal

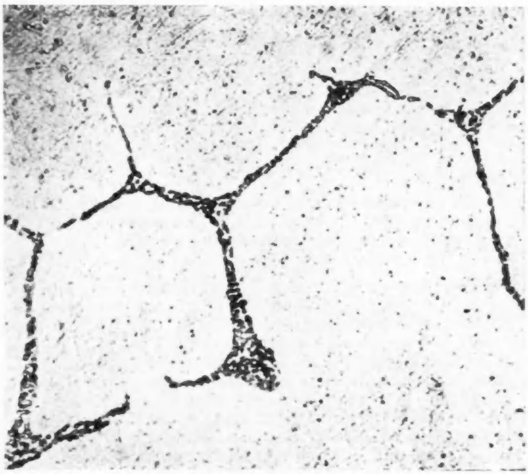


Fig. 1. Section of aluminium alloy containing 3 per cent. copper, polished and etched to show the compound $CuAl_2$ at the grain boundaries of the solid solution (magnification, ×500).

now containing a second metal—are harder and stronger than those of the pure metals. Many useful technical alloys are nothing but solid solutions of one or more metals in one base metal. Naturally, only a limited amount of the second metal dissolves in the first, just as the solubility of a substance in a solvent is limited. Still less will be dissolved if a third or fourth metal is present —in solid solution—in the base metal. For example, aluminium will dissolve some 5 per cent. copper at a temperature of 500° C.,

but if 1 per cent. silicon is also present, only 3 per cent. copper will be soluble in aluminium at 500° C.

As the melt cools down, however, say to 400° C., the solubility decreases in a way similar to that of a substance in a liquid solvent as the temperature falls; if copper alone is present in aluminium, 2 per cent. will remain in solution at 400° C. If silicon is present as well, the solubility at 400° C. will only be 1 per cent. for copper and 0.25 per cent. for silicon. In other words, what happens on cooling a melt is similar to the behaviour of saturated aqueous solutions. When a saturated solution of alum in water cools to the freezing point, crystals of alum and water solidify in the well-known way and form a crystal mixture of definite composition, having thrown all excess alum out of solution. Exactly the same thing happens when metal solutions cool and solidify. That portion of the metal which ceases to be soluble as the temperature decreases crystallises out, until the remaining solution solidifies as a mixture of a definite composition, which is called the eutectic composition. This can be seen in a polished and etched specimen of the alloy under the microscope.

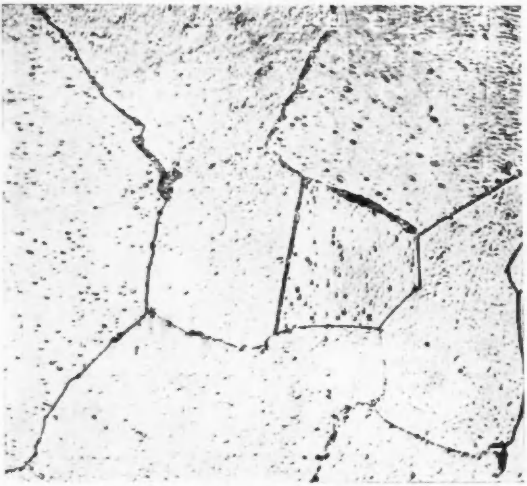


Fig. 2. Section of alloy shown in Fig. 1 but after heating to 500° C. to give a homogeneous solid solution (magnification, ×500).

The photomicrograph of an aluminium-copper alloy with 97 per cent. aluminium and 3 per cent. copper (Fig. 1) shows primary crystals which have been thrown out of the cooling solution, and these are surrounded by eutectic which fills the spaces between the crystals of solid solution like the mortar between bricks. This eutectic helps therefore still further in strengthening and hardening the alloy, but too great an amount of eutectic between the crystals—just like too much mortar between bricks—will render the whole structure brittle.

Heat-treatment is designed to absorb this eutectic into the crystals by heating the alloy to a temperature below the melting point of the eutectic. Here ends the analogy with mortar and bricks; bricks cannot absorb mortar, but metal crystals can absorb surrounding eutectic—moreover, they can absorb the eutectic while both crystals and eutectic are in the solid state. The absorption will take place when the heating is maintained for some hours, but if the heating is not carried high enough, the eutectic will be imperfectly dissolved.

The second micrograph (Fig. 2), shows the same alloy as before after heating to 500° C. When, after some hours, the absorption or solution of the eutectic "mortar" into the crystals is regarded as complete, the metal is quenched in cold or boiling water, or rapidly cooled in air blast, and will then consist of solid supersaturated solution crystals, containing nearly all the secondary constituent—or constituents—which were soluble in the base metal at the higher temperature. Only a small proportion of eutectic will remain in the intercrystalline spaces, just sufficient "mortar" to hold the "bricks" firmly in their position. This is referred to as the solution-quenched condition.

The alloy is now appreciably more ductile than before, and much more resistant to shock. It is not, however, much harder, and the tensile strength, too, will not always have increased remarkably. This artificially rich, supersaturated solid solution can also not be regarded as stable—but it is now in many respects more useful for engineering purposes, or for further manufacture, as the yield point (or proof stress) is considerably higher, this being the mechanical property needing improvement.

Maximum Hardening

The maximum hardening effect is obtained only when the alloy is heated to the specified temperature, which is as high as practicable: too high a temperature would result in partial melting of the eutectic, and if this

would become liquid, leaving only the crystals solid, the eutectic would partly run out from the spaces between the crystals thus spoiling the mechanical properties. Fig. 3 is a photograph (actual size) of surface of over-heated aluminium alloy sheet.

Photograph (actual size) of surface of over-heated sheet.

Behaviour of Supersaturated Solutions

It is understandable that in many cases the excess elements or compounds contained in these solid supersaturated solutions tend to re-precipitate out of solution. This internal re-precipitation causes straining of the crystals of the solid supersaturated solution, thus increasing the hardness of the alloy. This re-precipitation may take place within a few days or weeks at ordinary temperatures, a phenomenon which is called age-hardening, or it can be initiated or artificially accelerated by raising the temperature slightly. This means, in effect, that if the alloy is subsequently re-heated—but to a temperature much lower than for the first heat-treatment—its strength and hardness are considerably increased at the cost of ductility. This second heat-treatment is referred to as precipitation treatment.

When two metals are dissolved in one base metal, it may occur that they react with one another, in which case they are no longer present in their original form but as a metallic compound.

This happens, for instance, when both magnesium and silicon are present in aluminium. Mg and Si form a hard compound, Mg_2Si, which behaves exactly as if only one metal besides aluminium were present; an aluminium alloy containing such a compound is called a quasi-binary alloy. Solution treatment can be applied as described before, but the hardening effect of such an intermetallic compound is much higher than the one obtainable by a single metal. This is the theoretical explanation of Wilm's invention, and the exceptional mechanical properties obtainable with alloys like Duralumin, Superduralumin, Hiduminium, Skleron, etc., are based on the hardening effect of the compounds $CuAl_2$, Mg_2Si, and AlLi or other more complex compounds.

(The illustrations to this article are published through the courtesy of the Wrought Light Alloys Development Association).

BIBLIOGRAPHY.

Heat-Treatment of Aluminium Alloys.

1911 A. WILM, Physikalisch-metallurgische Untersuchungen über magnesiumhaltige Aluminiumlegierungen. *Metallurgie*, **8**, 225.

1919 MERICA, WALTENBERG and SCOTT, Heat-Treatment of Duralumin. *Bull. A.I.M.E.*, 913-49, and U.S. Bureau of Standards, Scientific Paper No. 437.

1921 HANSON and GAYLER, The Constitution and Age-Hardening of the Alloys of Aluminium with Mg and Si, *J. Inst. Metals*, **26**, 321.

1926 GUILLET and GALIBOURG, Recherches sur le traitement thermique des alliages aluminium-cuivre. *Revue Metallurgique*, **23**, 179.

1928 ARCHER, KEMPF and HOBBS, Heat-Treatment of Aluminium-Silicon Alloys. *Proc. A.I.M.M.E.*, p. 198.

1930 MEISSNER, The Artificial Aging of Duralumin and Super-Duralumin. *J. Inst. Metals*, **44**, 207.
TAMMANN, Die Vorgänge bei der Vergütung. *Z. Metallk.*, **22**, 365.

1931 DEVEREUX, Heat-Treatment and Forging of some Light Alloys. *Metallurgia*, **5**, 45.

1932 BUDGEN, Heat-Treatment and Annealing of Aluminium and its Alloys (Chapman & Hall, London).
GAYLER and PRESTON, The Age-Hardening of some Aluminium Alloys of High Purity. *J. Inst.* Metals, **48**, 197.

1933 DESCH, Aging and Age-Hardening in Metals. *Metal Industry* (London), **42**, 3.

1935 ROBINSON, Factors Governing the Heat-Treatment of Aluminium Alloys. *Metallurgia*, ***11***, 129 and ***12***, 51.

1936 TEED, Duralumin and its Heat-Treatment (Griffin & Co., London).
TALBOT and NORTON, Age-Hardening of Magnesium-Aluminium Alloys, Metal Technology, No. 2, *A.I.M.M.E. Tech. Pub.*, 692.
FINK and SMITH, Age-Hardening of Aluminium-Copper and Aluminium-Magnesium Alloys. Metal Technology, Nos. 3, 4, and 8, *A.I.M.M.E. Tech. Pub.*, 706 and 760.

1937 ZEERLEDER, Die Ausscheidungshärtung von Aluminium-guss-stücken. *Aluminium*, ***19***, 53.

1938 PETROV, Age-Hardening of Copper-Aluminium Alloys. *J. Inst. Metals*, **62**, 63 and 81.

1939 Symposium Amer. Soc. of Metals: Age-Hardening of Metals (Precipitation Hardening).

1940 KEMPF, Heat-Treatable Aluminium Alloys. *Metal Industry*, (London), **56**, 288, 312.
ARROWSMITH and WOLFE, The Use of Refrigeration for Delaying Age-Hardening of Duralumin-Type Alloys. *J. Inst. Metals*, **66**, 149.
1941 TOWNS ROBINSON, Review of the present Technique of Heat-Treatment as Applied to Wrought Alloys. *Metallurgia*, **24**, 15.
1942 Wrought Light Alloys Development Association, Birmingham, Information Bulletins: No. 2, Guide to the Properties of the Wrought Aluminium Alloys; Nos. 3 and 4, Heat-Treatment of the Wrought Aluminium Alloys. (Practice and Equipment.)
1943 SEGELER, Heat-Treatment of Aluminium Alloys and Application of Gas to Aluminium and Magnesium Heat Treating. *Indust. Gas*, **21**, 8, 23.

Heat-Treatment of Magnesium Alloys.

1927 MEISSNER, Age-Hardening Tests with Elektron Alloys. *Engineering*, **124**, 587.
1929 GANN, Treatment and Structure of Magnesium Alloys. *Trans. A.I.M.E.*, Inst. of M., p. 309; *J. Inst. Metals*, **42**, 455.
1930 HASHIMOTO, The Age-Hardening of some Magnesium Alloys. *J. Inst. Metals*, **44**, 504.
1934 SCHMID and SIEBEL, Vergütung von Elektronlegierungen. *Metallwirts.*, **13**, 765.
1936 TALBOT and NORTON, Age-Hardening of Magnesium-Aluminium Alloys, Metal Technology No. 2. *A.I.M.M.E. Techn. Publ.*, 692.
1937 MCGIVERN and WILKINSON, Precipitation Hardening of a Magnesium Alloy containing 8% Aluminium; Heat-Treatment of a Magnesium Alloy containing Zinc and Aluminium. Bull. 50, 52, 54, 60 and 61, Engineering Experiment Station, Dept. Mining and Metallurgy, Washington.
1938 BOLLENRATH, Physikalische und mechanische Eigenschaften von Magnesiumlegierungen, "Werkstoff Magnesium," (V.d.I. Verlag, Berlin).
1939 CHUBB, Age-Hardening Magnesium Alloys. *Light Metals*, **2**, 136, 184, 221, 257, 387, and **3**, 68, 109.
VOSSKUHLER, Vergütung kalt bearbeiteter Aluminium-Magnesium Legierungen. *Metallwirts.*, **18**, 873.
Handbook of Magnesium Alloys, Magnesium Section of the Metals Handbook (Am. Soc. for Metals), 1581-88.
1940 BECK, Technology of Magnesium and its Alloys (Hughes & Co., London, and Magnesium Elektron, Ltd.).
1941 FISHER, Structural Changes Produced in a Magnesium Alloy by Heat-Treatment. *J. Inst. Metals*, **67**, 289.
1942 FOX, Alloys of Magnesium. *Metal Industry*, **60**, 220, 239, 260.
1943 FOX and GARDNER, An Investigation of the Effects of Precipitation Treatment of Binary Magnesium Alloys. *J. Inst. Metals*, **69**, 373-396.
Dow Chemical Co., Michigan, Magnesium Alloys.
American Magnesium Corp., Cleveland, Ohio, Properties of Magnesium Products.

REPRESENTATIVE HEAT-TREATABLE ALUMINIUM ALLOYS

(A.) *Alloys for Sand and Die Castings*

Specification	Composition	Tensile strength tons/sq. in.	Elongation %	Brinell Hardness Number
(1) D.T.D. 238 as cast ...	1.5-2.5% Cu	9	—	60
D.T.D. 131A	0.8-2.0% Ni			
(Same, heat treated) ...	1.4-1.8% Mg			
	1.1-1.5% Fe			
Hiduminium RR53 ...	up to 2.0% Si			
	balance Al			
Solution treatment:—2-4 hours at 520-535°C. Quench in boiling water, oil or air blast. Precipitation treatment:—10-20 hours at 150-170°C., or 5-10 hours at 200°C.				
Quench in water or cool in air	Sand cast	18-20	0.5-1.0	124-148
	Die cast	21-23	0.5-1.5	124-148
Application:—For parts subject to elevated temperatures, used for pistons, air-cooled cylinder heads, etc.				
(2) D.T.D. 313 as cast ...	0.8-2.0% Cu	10	2	60
D.T.D. 309	0.5-1.5% Ni			
(Same, heat treated) ...	0.3-0.8% Mg			
Hiduminium RR53C ...	0.8-1.4% Fe			
	2.0-3.0% Si			
	up to 0.3% Ti			
	balance Al			
Solution treatment:—2-3 hours at 520-525°C. Quench in boiling water, oil or air blast	Sand cast	14-15	2-3	70-75
	Die cast	17-19	2-3	75-85
Precipitation treatment:—16 hours at 165-175°C.				
Quench in water or cool in air	Sand cast	18-20	1-2	100-115
	Die cast	19-21	1-2	110-121
Application:—For structural components; not suitable for pistons.				

(3) B.S.S. 2L24	3.5-4.5% Cu	10 (sand)	1-1.5	80-85
Y alloy, as cast	1.8-2.3% Ni	12 (die)	1-2	85-90
	1.2-1.7% Mg			
B.S.S. L35	up to 0.6% Fe			
Y alloy, heat treated ...	up to 0.6% Si			
	(Fe+Si=1%)			
	balance Al			
Solution treatment :—Not less than 6 hours at 500-520°C.—Quench in boiling water.				
Aging at room temperature: for 5 days.				
	Sand cast	14-17	—	100-125
	Die cast	18-20	2-3	105-130

Application :—For cylinder heads and castings for use at elevated temperatures.

(4) D.T.D. 245	10-13% Si	10	5	55-60
Alpax Gamma	up to 0.6% Fe			
BA 40/M	up to 0.6% Mg			
NA 161	up to 0.6% Mn			
	balance Al			
Heat treated	Sand cast	15-18	0.0-1.0	95-105
	Die cast	19-22	0.5-1.5	100-115

Application :—Purposes requiring the castability of the aluminium-silicon alloys combined with the greater strength and hardness obtainable by the use of additions and heat-treatment.

(B.) Wrought Aluminium Alloys

(1) Duralumin	3.5-4.8% Cu			
Hiduminium 72	0.8-1.8% Mg			
NA 24/S	0.3-1.5% Mn			
D.T.D. 270, etc.	up to 0.7% Fe			
	up to 0.5% Si			
	balance Al			
Solution treatment :—2-6 hours at 495-505°C. Quench in water.				
Age treatment :—Natural aging for 3 to 4 days to obtain maximum mechanical properties				
Duralumin sheet, bar and sections		28-30	15-20	125-148
Duralumin tubes		29-31	—	129-148

Application :—Natural aging alloy attaining good mechanical properties after only one heat-treatment.

(2) D.T.D. 130A (bars) ...	1.8-2.5% Cu			
D.T.D. 220A (tubes) ...	0.6-1.4% Ni			
D.T.D. 246A (forgings) ...	0.6-1.2% Mg			
Hiduminium RR56 ...	0.6-1.2% Fe			
	0.5-1.2% Si			
	0.05-0.15% Ti			
	balance Al			
Solution treatment :—2-6 hours at 525-535°C.				
Quench in hot water		22-26	15-22	80-100
Precipitation treatment :—10-20 hours at 165-180°C.				
Quench in water or cool in air		27-30	10-15	121-138

Application :—General purpose wrought alloy for air frames, wing spars, connecting rods.

(3) Aluminium-magnesium alloy	6.5-7.25% Mg			
M.G.7	0.3-0.6 % Mn			
D.T.D. 177A (sheet, hard)	up to 0.75% Fe	26-30	15	90-115
D.T.D. 182A (sheet, annealed)		20-23	20	
D.T.D. 186A (tubes, hard)	balance Al	26		90-115
D.T.D. 190 (tubes, annealed)		20-25		
D.T.D. 194 (bars)		21-25	15	90-115

The alloy can be softened by annealing at 380°C.

Application :—Corrosion resistant rolling and forging alloy.

Specification	Composition	Tensile strength tons sq. in.	Elongation %	Brinell hardness number
(4) Aluminium - zinc - magnesium-copper alloy D.T.D. 363 ... ... Hiduminium RR77 ...	1.5-3.0% Cu 4.0-6.0% Zn 2.0-4.0% Mg up to 0.6% Fe up to 0.6% Si up to 1.0% Mn up to 0.3% Ti balance Al			
Annealed extrusions and pressings		12-14	14-20	45-65
Solution treatment :—2-3 hours at 455-465°C. Quench in water ; naturally aged		29-32	16-21	130-140
Precipitation treatment :—15-20 hours at 130-140°C.—Cool in air		33-38	10-16	160-180

For structural purposes chiefly used as extrusions.

REPRESENTATIVE HEAT-TREATABLE MAGNESIUM ALLOYS

(C). Alloys for Sand and Die Castings

Specification	Composition	Tensile strength tons sq. in.	Elongation %	Brinell hardness number
(1) D.T.D. 136A ... ... Elektron AZ91 ... ... Magnuminium 220 ...	9.0-11.0% Al 1.0- 3.5% Zn up to 0.5% Mn up to 1.0% imp. balance Mg	8-11	2-4	50-60
Solution treatment :—16 hours at 420-435°C. (D.T.D.281)—Quench in water		13-16	4-10	50-60
Precipitation treatment :—12 hours at 190°C. (D.T.D.285)—Cool in air		15-17	1-3	85-95

Application :—Pressure-tight sand and die castings.

Specification	Composition	Tensile strength tons sq. in.	Elongation %	Brinell hardness number
(2) D.T.D. 59A ... ... Elektron A8 ... ... Magnuminium 181 ...	up to 8.5% Al up to 0.4% Cu up to 0.5% Mn up to 3.5% Zn up to 0.4% Si up to 0.1% Fe			
	Sand cast	9-11	2-5	45-55
	Die cast	14-16	8-12	45-55
Solution treatment :—8 hours at 420°C. (D.T.D.289)—Quench in water	Sand cast	13-15	6-12	45-55
	Die cast	15-17	10-15	45-60

Application :—Permanent mould cast parts of good strength.

(D.) Wrought Magnesium Alloys

Specification	Composition	Tensile strength tons sq. in.	Elongation %	Brinell hardness number
(1) D.T.D. 88B ... ... Elektron AZ855 ... ... Magnuminium 166... ...	up to 11.0% Al up to 1.0% Mn up to 1.5% Zn up to 1.5% imp. balance Mg	18-24	8-15	65-75
(2) D.T.D. 322 ... ... Magnuminium 288A ...	up to 11.0% Al up to 1.0% Mn up to 2.0% Zn up to 0.4% Cu up to 0.3% Si balance Mg	17-24	5-12	80-90

Solution treatment with following precipitation treatment

Application :—(1)—General forging alloy ; (2)—High strength wrought alloy.

Columbium

Pure Metal Derived from the Oxide

AT the April meeting of the American Electrometallurgical Society a new process for the reduction of columbium oxide to pure columbium (known more usually as niobium in Europe) was described by the discoverers, C. C. Balke and C. W. Balke, of the Fan Steel Corporation, North Chicago. In addition, details relating to the handling of the product of reduction by the powder metallurgy technique were given.

Preparation of the Oxide

First of all, columbium oxide of high purity is prepared from the columbium residues. Part of this is mixed with lamp black and heated in an inert atmosphere to form columbium carbide, which is mixed in equimolecular proportons with the original oxide, according to the equation :

$$Cb_2O_5 + 5CbC \rightarrow 7Cb + 5CO.$$

This mixture is heated *in vacuo*, when carbon monoxide is liberated, leaving behind columbium metal. It is claimed that the yield is almost that calculated from the equation.

The metal produced is next powdered in a ball mill and pressed into bars under a load of 50 tons/sq. in. Bars intended for the production of rod or wire are made square in cross-section; those to be rolled into sheet are made rectangular with a width at least twice the thickness. When pressed, the bars may be handled without danger of breakage and may be gripped firmly by the water-cooled terminals of the sintering furnace without fear of crushing. Sintering is carried out *in vacuo*, the heat being generated by the resistance of the bars to the passage of the electric current through their mass. In addition to sintering, this process of heating *in vacuo* causes a beneficial reduction in the gas content of the metal. This is of particular importance with respect to oxygen, the presence of which, even in small amounts, renders columbium hard and brittle. The sintered metal is worked under a heavy hammer and re-sintered to produce a product solid and free from pores.

Commercial Application

The metal is now ready for commercial application. Bars may be hammered, rolled, swaged, etc. If sheet is made it may be spun or drawn. It may be worked at room temperature. Indeed, the metal is never heated in the air even for welding operations. Articles made by the above processes and suffering from strain hardening may be annealed by heating *in vacuo*.

The properties of columbium produced as above were described as follows. "Columbium is a platinum-white, soft, ductile metal. Its density, 8.4, is about half that of tantalum. Its linear co-efficient of expansion is 7.2×10^{-6} and its electrical resistance is 17.0 microhms per c.c. at 20°C. The work function of columbium is the lowest of any of the pure refractory metals, being 3.96 volts. The literature gives 1950°C. as the melting point. This figure is too low. The correct one is probably above 2100°C."

In the past columbium has enjoyed very little commercial importance owing to the limited amount available. However, it is understood that several investigations to find new uses for it are under way. It has already been demonstrated to be as suitable as gold alloys for fountain-pen nibs on account of its strength and springiness and the readiness with which it may be welded to iridium alloy tips. In addition it is not corroded by acid inks. Other potential applications are in certain electronic tubes and some chemical equipment where its lightness and toughness may be advantageous.

Diagrams of Reducibility

New Aid for Metallurgists

DIAGRAMS showing the variation with temperature of the standard free energies of formation of the oxides and sulphides of metals and of certain non-metals commonly used in metallurgical reduction processes were given in a recent lecture by H. J. T. Ellingham at Swansea, which is now printed in *J.S.C.I.*, May, 1944, p. 125. These diagrams make it possible to obtain a general picture of the ranges of temperature and pressure within which oxides and sulphides may be reduced by various types of reduction process, and indicate ranges of conditions under which particular reactions will certainly not occur, thus giving valuable negative information which can save wastage of time and effort in research and development work. The positive data they provide should serve as a guide to directions in which existing metallurgical processes might be improved and new methods devised. The author suggests that similar diagrams for other classes of chemical reactions might serve a correspondingly useful purpose in connection with other fields of industry; *e.g.*, a similar method of representing free energy data for the formation and oxidation of hydrocarbons should be of value in relation to the petroleum and allied chemical industries.

Aluminium Alloys

Information on Resistance Welding

ENORMOUS strides have been made in the spot welding of aluminium alloys during the last two or three years, and further developments are continually taking place. The latest Bulletin (No. 6) of the Wrought Light Alloys Development Association deals with "Resistance Welding of Wrought Aluminium Alloys" and claims, with reason, to be as up to date as it is possible to make it.

It is complementary to the previous one which dealt with the welding of the wrought aluminium alloys by gas and the electric arc. Resistance welding includes spot, seam, and butt welding. Of these, spot welding is by far the most important; seam welding and butt welding being scarcely used at present in this country, as machines suitable for the purpose are not available. The greater portion of this booklet deals with the spot welding process, and attention is devoted to the weldability of various classes of aluminium alloy. The different types of welding machine available, namely, A.C. machines and the two ranges of stored energy machines, are described and illustrated, and there is a short section dealing with the choice of suitable equipment. The importance of surface preparation is stressed, and particular attention is paid to methods of cleaning the sheet and removing the oxide film. The chromo-sulphuric acid pickle and phosphoric acid solution are dealt with in detail. Methods of assembly are briefly summarised and there is a section on machine settings, while diagrams illustrate the various defects to be avoided. Design considerations, including recommendations for minimum weld spacing and edge distance, are also dealt with, and the booklet concludes with appendices summarising British Standard Specification 1138, the pickling of aluminium alloy sheets, and a selected bibliography.

ELECTROPLATING U.S. ARMY SUPPLIES

The scarcity of metals such as copper, zinc, nickel, aluminium, and their alloys has led to the substitution of steel for many military supplies formerly made of these non-ferrous metals. In most instances the steel articles require protection against corrosion, which is frequently accomplished with electroplated coatings. According to a recent paper by Dr. William Blum, relatively little nickel plating is now applied to military supplies. Cadmium plating is extensively employed on fuse parts and aircraft fittings, but zinc is substituted wherever possible. Lead plating is being used to an increasing extent, and chromium and silver coatings find many applications. Camp tests on plated steel tableware show that resistance to abrasion is more important than protection against corrosion; chromium coatings directly on case-hardened steel are useful on both tableware and mess trays. The electroplating of military equipment has absorbed the full capacity of most of the plants formerly engaged in plating civilian supplies.—*J. Franklin Institute*, August, 1943.

Magnesium Alloy Finish

Corrosion-Resistant Film Developed

ENGINEERS of the Consolidated Vultee Aircraft Corporation have recently developed in America a protective coating for magnesium alloys which claims to render them as resistant to corrosion and abrasion as aluminium alloys. This coating, of the anodic film type, is described as extremely tight, withstanding readily a potential of 110 volts, which, together with its resistance wear, accounts for its ability to retard corrosion. Further, according to the results of accelerated tests, it appears that magnesium alloys coated with the new finish are in some cases more resistant to corrosion than anodised duralumin, and are always at least its equal in this respect. Resistance to abrasion has been found to be 50 to 100 times superior.

The Bakerian Lecture

New Synthesis of Cellobiose

IN his Bakerian lecture to the Royal Society on June 15, dealing with the structure, funcion, and synthesis of polysaccharides, Professor W. N. Haworth, F.R.S., referred to a new chemical synthesis of cellobiose by a simple and direct method devised by Stacey and Gilbert. He added that the structure of the repeating unit in cellulose is therefore well established; the micro-biological synthesis of the polysaccharide was achieved by Hibbert. Starch, another functional material of the plant, is recognisable as two structural types of polysaccharide: amylose, giving the deep blue coloration with iodine and representing about 25 per cent. of natural starch, and amylopectin, the remaining 75 per cent., giving a reddish-blue colour. Amylose, synthesised both by plant and muscle phosphorylase, is represented as a continuous chain of maltose units, and this is completely hydrolysed to maltose by β-amylose. Amylopectin is also composed of maltose units in shorter chains which are united as a laminated or branched-chain structure, and this is hydrolysed in stages to maltose and various dextrins. The factor responsible for the synthesis of amylopectin has not yet been isolated, but attempts in this direction have been made. Products related to amylopectin have been obtained by Dr. Peat, but their identity is not yet established.

Many of the specific and somatic bacterial polysaccharides contain amino-glucose and uronic acids as constituent units. The constitutional relationship of these polysaccharides is only partly revealed, although some synthetic analogues which are bioses are seen also to have antigenic properties. Structurally related to these are the polysaccharides produced by non-pathogenic organisms such as Rhizobia, and the plant gums which also contain uronic acid groups. Heparin, the blood anti-coagulant factor of liver, contains glucosamine and glucuronic acid units together with acetyl and sulphate residues. The chondroitin of cartilage is similar in the composition of its individual units except that galactosamine (or talosamine) replaces glucosamine.

Constitution of Levans

The synthesis of the levans by enzymes has been frequently reported; their constitution is now established, as is also that of the dextrans from *Penicillium luteum* and *Leuconostoc dextranicum*. These are 1 : 6 glucopyranose polymers.

Bacillus welchii, the gas-gangrene organism, is convertible into a gram-negative form by sodium cholate extraction. The gram-positive character can be restored by combination with the magnesium salt of ribonucleic acid. The constitution of both this acid and desoxy-ribonucleic acid is partly revealed by the recognition of ribo- and desoxyribofuranose units whose mode of combination, whether single or linked units, is not yet known.

CONSTANT DISTILLED WATER

An important matter to any chemical laboratory is the supply of distilled water. An interesting feature of the new Materials Testing Laboratory of the U.S. Bureau of Standards is a completely automatic system for preparing distilled water. The controls are designed to start the still when the level of distilled water in the reservoir reaches a predetermined minimum and to shut it off when the reservoir is filled. The water in the boiler is automatically discharged from time to time to prevent excessive accumulation of impurities. These controls are likely to minimise the attention required for the production of distilled water for the several laboratories in the building. The distributing line from the reservoir to the different floors of the building is made of an alloy not previously used, so far as is known at the Bureau, in distilled water systems. This is tin alloyed with about 3½ per cent. of silver. Tests made several years ago showed this alloy to be much superior in mechanical properties, especially strength and freedom from creep, to the pure tin commonly used for distilled-water pipes. No evidence was obtained that distilled water is contaminated by contact with the alloy. The experimental use of the silver alloy in this relatively short line should furnish definite information concerning its suitability for future installations.

FINLAND'S CHEMICAL INDUSTRY

In a recent lecture to the chemical section of the Helsinki Technical Association, Mr. Oernhjelm discussed the future development of Finland's chemical industry. According to the speaker, the main obstacle is the limited potential market, which would make for unduly high production costs. He considered that only the cellulose industry offered favourable prospects for mass production. The rise of the cellulose industry in pre-war days necessitated the establishment of chlorine plants, but war-time difficulties interfered with utilisation of the chlorine available. The production of several new compounds such as chlorinated actylene was therefore taken up. M. Oernhjelm recommended that the question of how to utilise sulphite liquor from cellulose should be investigated, and that increased attention should be paid to the training of chemists and the establishment of research laboratories.

General News——From Week to Week

There will be no change in the prices to large trade users and wholesalers of refined oils and imported edible animal fats for the eight weeks ending August 19.

A grant of £250 for one year towards research at Cambridge University on the physical chemistry of polymerisation is being made by the Distillers' Company.

The latest Fuel Efficiency Bulletins, Nos. 29 and 30, deal respectively with "The Industrial Use of Compressed Air" and "The Unorthodox Use of Economisers."

Reverse lend-lease given by Britain to the United States totals to date over £500,000,000, stated the Minister of Production last week.

The address of Plastics Control, Ministry of Supply, has changed to: Terminal House (5th Floor), 52 Grosvenor Gardens, London, S.W.1 ('Phone: SLOane 2271).

The University Court of Edinburgh has approved the alteration of the title of the "Department of Chemistry in relation to Medicine" to "Department of Biochemistry."

The British Leather Manufacturers' Research Association has doubled its membership during the past year. At the exhibition held at the laboratories in Nelson Square on June 13-16, items of chemical interest were many, and included a sample of a synthetic solving material made from polyvinylidene chloride.

The exhibition "Chemicals in War and Reconstruction," organised by the A.Sc.W., will be on view in the Art Gallery, Ramsden Street, Huddersfield, during the week July 7-14, between 10 and 7.30. It will be opened at 6 p.m. on July 6 by Mr. G. B. Jones, F.R.I.C., A.M.Inst.C.E., chairman of the Yorkshire section of the S.C.I.

A proposal to form a group dealing with physical methods of analysis is being considered by the Council of the Society of Public Analysts. The final decision as to whether such a group should be established will depend on the number of prospective members, and those interested are invited to notify the Society's hon. secretary, 7-8 Idol Lane, London, E.C.3.

Arrangements have been made by the Ministry of Supply (Sundry Materials Branch) for the formation of an agency to handle imported Indian glue-stock. Firms who imported and despatched to ultimate consumers an aggregate minimum of 500 tons during 1939-43 are invited to apply, for membership of the above agency, to Kidsons, Taylor & Co., 52 Lincoln's Inn Fields, London, W.C.2.

Copies of the syllabus and programme of the special training courses for industrial safety officers, organised for the Factory Department of the Ministry of Labour and National Service (to be held at Wadham College, Oxford, during July), can be obtained from the Royal Society for the Prevention of Accidents, 52 Grosvenor Gardens, London, S.W.1.

High Duty Alloys, Ltd., Reynolds Tube Co., Ltd., and Reynolds Rolling Mills, Ltd., have formed a new company—Hiduminium Applications, Ltd.—to collaborate with designers and constructors in any industry to secure the best use of "Hiduminium" aluminium alloys. Further information will be sent on request to Hiduminium Applications, Ltd., Farnham Road, Slough, Bucks.

Expenditure on research in welding this year is expected to amount to £20,000, according to the latest progress report of the Research Council of the Institute of Welding. The D.S.I.R. has agreed to increase its grant from £4500 to £9000, subject to an industrial contribution of £12,000, and an appeal for subscriptions towards this amount is being made.

A new vacuum-melting process has enabled British Unicorn, Ltd., of Southampton Street, London, W.C.2, to produce malleable beryllium, of which sheets and discs are now available in thicknesses of 0.02, 0.01, and 0.004 in. The usual sheet size, for use as X-ray tube windows, is about 1 in. by 2 in., the maximum size so far obtainable being 1½ in. by 6 in.

The British Coke Research Association has been registered as a company limited by guarantee without share capital. Its aim is to promote research in relation to the production and utilisation of coke and coking plants, as well as to the distillation of coal and the resultant by-products, except any by-product coming within the scope of the National Benzole Association and the Sulphate of Ammonia Federation.

Beryllium copper in instrument design is the subject of an article by Dr. L. B. Hunt, of Mallory Metallurgical Products, Ltd., in the June number of the *Journal of Scientific Instruments*. The high elastic limit and low elastic modulus of this alloy make it useful for springs and pressure-responsive elements. Normally it contains 2.25-2.5 per cent. beryllium, but the addition of a small amount of cobalt gives more uniform physical properties; for instance, Mallory 73 beryllium copper, which has become available during the war, has the composition: Be 2 per cent., Co 0.5, Si 0.1, the remainder being copper.

The Limitation of Supplies (Polishes) (No. 5) Order, 1944 (S.R. & O. 1944, No. 677), continues for a further period of six months, to December 31, 1944, the existing control on the supply of polishes containing wax, at present maintained by the Limitation of Supplies (Polishes) (No. 4) Order, 1943 (S.R. & O. 1943, No. 1733).

Foreign News

The synthetic oil plant at Ruhland, 50 miles south-east of Berlin, was the main target for American bombers making the first shuttle trip from Britain to Russia.

According to estimates based on deliveries made during the last two months, says the Ankara correspondent of *The Times*, about 90,000 tons of Turkish chrome will be available to the Allies in the course of 1944. Negotiations are to be begun for a readjustment of the prices of higher-grade chrome.

In East Africa the chemical import position has been serious for a long time, and this has inspired the local Industrial Council to approve plans for the construction at Nairobi of a plant for the production of sulphuric acid and associated chemicals by hydrogenation.

Aluminium salts shipped in the United States in 1943 increased 6 per cent. in quantity and 13 per cent. in value over 1942, according to the Bureau of Mines. Total production of salts rose from 600,913 to 642,311 short tons, and of alumina (excluding that produced for making aluminium) from 58,297 to 86,420 short tons.

The accelerated corrosion effect found when anti-fouling paints containing metallic copper are used to coat the hulls of steel ships has been studied at the Mellon Institute in America. According to an article in *Ind. Eng. Chem.* (1944, *36*, 4, p. 341) the corrosive attack on the basis metal is as severe under cuprous oxide paints as under metallic copper paints.

The ingot capacity of Iscor, the iron and steel corporation sponsored by the Government of South Africa, now exceeds 500,000 tons a year, as against 350,000 in 1939. *The Canadian Commercial Intelligence Journal,* which gives these figures, adds that output would be 600,000 tons but for the loss at sea of equipment that had been ordered.

A radiothermal technique for drying penicillin liquor has been developed by the General Electric Company of America, and the 24-28 hours which that process ordinarily takes is claimed to be cut to 30 minutes. Normally, the reduction of liquor to powder is carried out by vacuum sublimation of the frozen filtrate as illustrated in a recent issue of THE CHEMICAL AGE (1944, *50*, p. 575).

Exploitation of the large veins of chrome ore, with a stated average 50 per cent. metal content, discovered last year in the Sarugun District, Hokkaido (according to a Japanese radio announcement) is planned by the Teikoku Manganese Mining Co.

The preparation of artificial fibres from corpuscular and fibrous proteins like egg albumen and chicken-feather keratin is described by H. P. Lundgren and R. A. O'Connell in *Ind. Eng. Chem.* (1944, *36*, 4, p. 370). These proteins are dissolved in a detergent such as sodium alkyl benzenesulphonate, and the resultant viscous solution obtained with a mixing ratio of 40-60 to 60-40 protein/detergent is extruded through the holes of a spinneret (*e.g.*, of 0.003 in. diameter) into a coagulating bath of salt solution. An extension of over 700 per cent. has been reached with such fibres, which have tensile strengths that compare favourably with natural fibres.

Forthcoming Events

The London Section of the **Oil and Colour Chemists' Association** has arranged a series of post-graduate lectures, to be given by Professor E. K. Rideal, F.R.S., on the subject of "Colloid Science—Surface Action." The lectures take place at 6.30 p.m., on **July 6, 20** and **27,** respectively at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. The inclusive charge for the three lectures is 10s., to be paid in advance. Junior members are invited free of charge, but should inform the hon. secretary.

The London Section of the **Society of Chemical Industry** holds a joint meeting with the **Institute of Metals** on **July 13,** at 7.30 p.m., in the hall of the Institution of Mechanical Engineers, Storey's Gate, Westminster. Mr. A. R. Powell, of Johnson Matthey and Co., Ltd., will read a paper on "The Minor Metals."

The 63rd annual meeting of the **Society of Chemical Industry** will be held on **July 13** and **14.** On the first day there will be a meeting of the chairman and hon. secretaries of sections and groups, at 4.30 p.m., at Stewart's Restaurant, Old Bond Street, and this will be followed at 7.30 p.m. by a joint meeting of the London Section and the Institute of Metals, to be held at the Institution of Mechanical Engineers, Storey's Gate, S.W.1. The business meeting starts at 10.30 a.m. on the Friday, and the presidential address will be given at 11.30 a.m. The afternoon session begins at 2.45 p.m., when Professor A. V. Hill will give his Messel Medallist's address.

The annual general meeting of the **Institute of Factory Managers** will be held at the Hotel Russell, Russell Square, London, W.C.1, at 3 p.m., on **July 15.**

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

KEINER & CO., LTD., Mitcham, chemical manufacturers, etc. (M., 1/7/44.) June 9, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on lands, hereditaments and premises at Mitcham, machinery and fixtures, etc., also general charge. *£4400. January 11, 1944.

Company Winding-up Voluntarily

RARE EARTH CONCENTRATES, LTD. (C.W.U.V., 1/7/44.) June 8 (members). A. B. L. Murison, 1 Copthall Close, E.C., liquidator.

Company News

Turner & Newall, Ltd., are maintaining the interim ordinary dividend at 3¾ per cent.

Fricker's Metal and Chemical Co., Ltd., are paying 4 per cent. (same) ordinary dividend for the year ended December 31.

International Diatomite, Ltd., are paying no ordinary dividend for the year ended March 31, compared with 3 per cent. last year.

The Distillers' Co., Ltd., announces an annual dividend, to May 15 last, of 18¾ per cent. (16¼ per cent.), and a net profit of £2,039,346 (£1,947,221).

Barry & Staines Linoleum, Ltd., report a net profit of £83,269 (£70,286) for the year ended January 31, and a dividend of 7½ per cent. (6 per cent.) on ordinary shares.

B. Laporte, Ltd., chemical manufacturers, etc., have increased their nominal capital beyond the registered capital of £500,000 by the addition of £500,000 in £1 ordinary shares.

British Glues & Chemicals, Ltd., announce a first and final ordinary dividend of 10 per cent. (same) and 1 per cent. participation on the 8 per cent. preference, making 9 per cent. (same).

The Bleachers' Association, Ltd., have returned a net profit of £227,271 (£122,031) for the year ended March 31. Eighteen months' arrears of dividend on the 5¼ per cent. cumulative preference shares are being paid, bringing the dividends up to March 31, 1937.

Reckitt and Colman, Ltd., show a net profit for 1943 of £849,956 (£840,885) after deduction of tax (£100,000 more than last year) and subsidiary profits not distributed as dividend. The year's dividend is 20 per cent. (same). Of the subsidiaries, **J. & J. Colman, Ltd.,** with a net profit of £242,127 (£241,214), are making a distribution of 17 per cent. (16 per cent.); **Reckitt & Sons, Ltd.,** show a net profit of £458,099 (£460,194), and an unchanged dividend of 22½ per cent.

New Companies Registered

Luminous Plastics, Ltd. (388,195).—Private company. Capital: £2000 in £1 shares. Manufacturers of and dealers in paints, powders, inks, chemicals, plastic materials and products, etc. Directors: R. Cash, 26 Launceston Place, W.8; R. C. Deith.

Syntics, Ltd. (388,269).—Private company. Capital: £10,000 in £1 shares. Manufacturers of and dealers in plastics, synthetic resins, moulding powders, oil, colours, etc. Directors: G. L. Jones; H. Barkas-Carlile. Registered office: Baythorne House, Gordon Street, E.13.

Ratcliffe & Company, Ltd. (388,288).—Private company. Capital: £10,000 in 10,000 shares of £1 each. To acquire the business of paint, polish, and varnish manufacturers and merchants carried on at Belper, as "Adshead Ratcliffe & Co." Directors: C. C. Ratcliffe; F. G. Ratcliffe; G. M. Taylor. Registered office, Campbell Street, Belper, Derby.

Chemical and Allied Stocks and Shares

ALTHOUGH price-movements were mostly small, in the absence of selling, the undertone of stock markets was good, reflecting the war news from Normandy and the upward tendency in British funds.

In accordance with the general tendency in industrials, shares of chemical and kindred companies have lost part of recent gains, but movements did not exceed more than a few pence on balance. Imperial Chemical were 39s. 9d., Turner & Newall 84s. "ex" the maintained interim dividend, B. Laporte 82s. 6d., Lever & Unilever 39s., and Dunlop Rubber 46s. 6d. The units of the Distillers Co. rose sharply to £5 at one time on the higher dividend which was not generally expected in the market, and later eased to 99s. 6d., thereby losing only a small part of their rise. British Plaster Board were 35s. after touching 35s. 3d., and United Molasses 35s. 1½d. Borax Consolidated at 37s. 9d. showed a further small gain, while in response to the higher dividend, Barry &

Staines moved up to 50s. 6d. Textiles were firm, partly because sentiment benefited from the payment on account of arrears on Bleachers' preference, which rose to 22s. with the company's ordinary units better at 11s. 6d. Elsewhere, Bradford Dyers were 24s., and Calico Printers 16s. 6d. Courtaulds showed activity around 57s. awaiting the interim dividend. British Celanese were 30s. 6d.

Irons and steels were quite well maintained, United Steels being 27s. 4½d., Dorman Long 28s., Colvilles 25s. 10½d., Staveley 53s. 9d., and Sheepbridge 47s. 9d. Stewarts & Lloyds made 56s. 10½d., and Tube Investments 97s. 6d. Consett Iron 6s. 8d. units were 9s. 3d., and Guest Keen 38s. 7½d. Elsewhere, Associated Cement improved to 67s., and Tunnel Cement to 53s. 6d. Imperial Smelting became firmer at 14s. 6d., as did Amalgamated Metal at 18s. 6d., and General Refractories at 18s. 3d. Wall Paper Manufacturers deferred eased to 44s. 6d., and Lewis Berger to 106s., after touching 106s. 6d. De La Rue were 185s., pending the full results and chairman's annual statement. British Industrial Plastics 2s. shares changed hands around 7s. 4½d., and Erinoid around 11s. W. J. Bush were again quoted at 63s. 9d. and, as usual, firmly held, while British Drug Houses were 26s. 3d., Burt Boulton 24s., and Cellon 24s. 6d. British Glues & Chemicals 4s. ordinary changed hands up to 9s. 6d. Monsanto Chemicals 5½ per cent. preference kept at 23s., and Greeff-Chemicals 5s. ordinary at 8s.

Steady features were provided by Murex at 105s., British Match at 40s. 10½d., British Oxygen at 82s. 9d., and British Aluminium at 48s. Following their recent advance, Triplex Glass reacted to 42s. 9d. As in many other directions, the lower level was attributed to absence of renewed demand and not to selling, which appeared to be very light generally, reflecting confidence in the future and hopeful views as to an up-trend in dividends after the war when E.P.T. is abolished.

Boots Drug kept steady at slightly under 50s. on the announcement of a higher dividend. The accounts are expected to show maintenance of strong finances. In view of the dividend increase the chairman's annual statement will be awaited with attention in the market; the assumption is that the higher payment would probably not have been decided upon unless there were reasonable possibilities of its being maintained. Sangers 5s. ordinary were 26s. 10½d., and Timothy Whites 36s.

Gas Light & Coke ordinary were 21s. 1½d. and Low Temperature Carbonisation 1s. ordinary close on 2s. 9d. Metal Box ordinary at 90s. had lost part of an earlier improvement. United Glass Bottle shares were 70s. and continued firmly held. "Oil" shares failed to hold earlier gains; "Shell" and most of the other leaders, including Anglo-Iranian, were slightly lower on balance in accordance with the prevailing market tendency.

British Chemical Prices

Market Reports

MODERATE inquiry on the London chemical market during the week covered a fairly wide range of materials and the pressure for deliveries of supplies against contracts is maintained. There is no change in price to record and the undertone of the market remains firm, with a slight tendency towards higher levels. In the soda products section, bicarbonate of soda and nitrate of soda are receiving a steady inquiry, while the demand for bichromate of soda exceeds the quantities available. Hyposulphite of soda is in good request and yellow prussiate of soda is on offer only in small quantities, quotations for which are very firm. A moderate business has been transacted in acetate of soda. In the potash group most articles are available in much smaller quantities than are needed to meet present requirements, particularly in respect of bichromate of potash, yellow prussiate of potash, and solid caustic potash. The demand for permanganate of potash continues on steady lines, while new business has been placed in acid phosphate of potash. Among the miscellaneous chemicals, a steady trade is passing in peroxide of hydrogen, and the demand for British-made formaldehyde is maintained at a good level, with values well held. White powdered arsenic is a good market and a brisk inquiry is reported for sulphur. In the coal-tar products market fresh buying interest has not been particularly active, but a steady movement of supplies is reported for pitch and for crude and refined tar. The anthracene oils are a strong market and a good demand is in evidence for cresylic acid. The toluols, benzols, naphthas, and xylols are all steady.

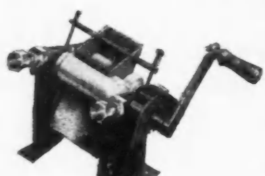
MANCHESTER.—Most of the chemical-using trades are maintaining a steady demand for deliveries on the Manchester market, and a fair volume of new business in the leading "heavies" has been reported during the past week. Caustic soda and other alkalis are in steady request, and interest is also being displayed in bleaching powder, carbonate and bicarbonate of ammonia, alum, formaldehyde, and hydrochloric and other acid products. In the tar products section, creosote oil is in brisk demand, as are also most of the light materials.

GLASGOW.—In the Scottish heavy chemical trade there is no change since last week, home business remaining rather quieter. Export trade remains rather restricted. Prices keep very firm.

J

D

s



Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, July 1st, 1944. Entered as Second Class Matter at the New York, U.S.A., Post Office.